

REMARKS

Claims 1-6, 8, 33-38, and 40 are presented for examination. The outstanding rejection under 35 U.S.C. 102 has been withdrawn.

In accordance with the Examiner's request, the specification on page 4 has been amended to delete the comma between the words "element" and "having."

Claims 1-6, 8, 33-38 and 40 have been rejected under 35 U.S.C. 103 as being unpatentable over Makino et al. (5,945,887) in view of Honjo (5,473,281). This rejection is respectfully traversed for the following reasons.

Claim 1 recites a high efficiency amplifier, connected to a non-reciprocal circuit element having an input impedance lower than a standard impedance and an output impedance substantially equal to said standard impedance. The amplifier comprises:

- an input terminal to receive an input signal;
- an output terminal connected to said non-reciprocal circuit element;
- an amplifier element to amplify said input signal; and
- one or a plurality of harmonic processing circuits arranged between said amplifier element and said output terminal to process a harmonic in an output signal of said amplifier element.

Independent claim 33, among other elements, also recites a high efficiency amplifier including:

- an input terminal to receive an input signal,
- an output terminal connected to the non-reciprocal circuit element via the transmission line,
- an amplifier element to amplify the input signal, and

-one or a plurality of harmonic processing circuits arranged between the amplifier element and the output terminal to process a harmonic in an output signal of the amplifier element.

The Examiner admits that Makino does not disclose one or a plurality of harmonic processing circuits arranged between the amplifier element and the output terminal to process a harmonic in an output signal of the amplifier element.

Honjo is relied upon for disclosing an impedance matching circuit (2, 3, 4 in FIG. 2) including two harmonic processing units (3, 4) for suppressing unwanted second and third harmonic components.

The Examiner takes the position that it would have been obvious "to include harmonic processing circuits, as taught by Honjo, in the matching circuit (16) of Makino et al. because such a modification would have been advantageously provided (sic) not only suppression of unwanted harmonic components but also impedance matching between the output amplifier element and the output terminal for optimum energy transfer."

In rejecting claims under 35 U.S.C. § 103, it is incumbent upon the Examiner to provide a basis in fact and/or cogent technical reasoning to support the conclusion that one having ordinary skill in the art would have been motivated to combine references to arrive at a claimed invention. *Uniroyal, Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 5 USPQ2d 1434 (Fed. Cir. 1988). These showings by the Examiner are an essential part of complying with the burden of presenting a *prima facie* case of obviousness. *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992).

As demonstrated below, the Examiner has failed to provide the requisite reasons for modifying Makino et al. and thus to establish a *prima facie* case of obviousness.

Considering the references, Makino discloses an amplifier 10 coupled to an isolator 1 (FIG. 2). The amplifier 10 includes "an output matching circuit 16 with an output impedance of 2 to 12.5 ohms, and which removes the reactance component only" (column 4, lines 54-56). The output of the output matching circuit 16 is coupled to the input port P1 having impedance set at 2 to 12.5 ohms (column 4, lines 25-27). As shown in FIG. 2, the input of the matching circuit 16 has impedance equal to 2-6 ohms.

Honjo discloses an amplifier circuit having a transistor 1 with an output terminal 6. The amplifier is connected to transmission line 7 having impedance of 50 ohms. An impedance matching circuit for connecting the output terminal 6 of the amplifier with the transmission line 7 includes lines 2, 3 and 4. The impedance of line 2 connected to the output terminal 6 is 13 ohm.

Hence, the impedance matching circuit of Honjo has 13 ohms at its input and 50 ohms at its output. Accordingly, the Honjo's impedance matching circuit cannot be included into the output matching circuit 16 of Makino which matches impedance of 2-6 ohms with impedance of 2-12.5 ohms.

Therefore, one skilled in the art would have no motivation to include the impedance matching circuit of Honjo into the output matching circuit of Makino, as the Examiner suggests.

Moreover, it is well settled that if proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984). As discussed above, if the Makino's matching circuit 16 were modified to include the Honjo's matching circuit, the Makino's circuit would not be able to match impedance of 2-6 ohms at the output of the amplifier device 15 with impedance of 2-

12.5 ohms at the input of the isolator 1. Therefore, there is no suggestion or motivation for the modification proposed by the Examiner.

The Examiner has apparently failed to give adequate consideration to the particular problems and solution addressed by the claimed invention. *Northern Telecom, Inc. v. Datapoint Corp.*, 908 F.2d 931, 15 USPQ2d 1321 (Fed. Cir. 1990); *In re Rothermel*, 276 F.2d 393, 125 USPQ 328 (CCPA 1960). Specifically, as discussed in the background section of the specification, the high efficiency amplifier of the present invention does not contain a fundamental wave matching circuit arranged in conventional amplifiers. For example, a conventional amplifier illustrated in FIG. 35 of the present application has a fundamental wave matching circuit 112 that converts the output impedance of the amplifier to the 50 ohm standard value. The fundamental wave matching circuit causes substantial power loss and, therefore, reduces efficiency of the amplifier. Hence, it is desirable to exclude the fundamental wave matching circuit from an amplifier. However, if the output of an amplifier without a fundamental wave matching circuit is connected to impedance of 50 ohm or less, leakage power associated with harmonic components of the amplified signal increases. In order to address this problem, the amplifier of the present invention includes at least one harmonic processing circuit that reduces harmonic-related leakage power.

As described in the specification, the circuit configuration according to the present invention makes it possible to decrease the output impedance thereby minimizing the loss caused by the matching circuit while accomplishing the harmonic matching.

The applied references do not address the problem and solution addressed by the claimed invention. For example, Honjo discloses a conventional circuit arrangement

having a harmonic matching circuit and a fundamental-wave matching circuit. This arrangement does not solve the problems solved by the present invention.

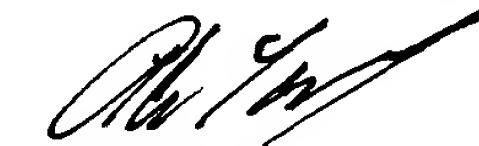
Dependent claims 2-6, 8, 32-38 and 40 are defined over the prior art at least for the reasons presented above in connection with the respective independent claims 1 and 33.

Accordingly, Applicants submit that the lack of any motivation for the proposed combination of references to arrive at the claimed invention, coupled with the particular problems addressed and solved by the claimed invention, undermine the basis for the Examiner's rejection of claims 1-6, 8, 33-38 and 40 under 35 U.S.C. 103 as being unpatentable over Makino et al. in view of Honjo. Applicants, therefore, respectfully request that the rejection under 35 U.S.C. § 103 is improper and should be withdrawn.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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